

KEY DATING FEATURES FOR TIMBER-FRAMED DWELLINGS IN SURREY

Rod Wild and Andy Moir

The main component of the Surrey Dendrochronology Project is the accurate dating of 177 ‘dwellings’, nearly all by tree-ring analysis. The dates are used to establish date ranges for 52 ‘key features’, which cover many aspects of timber-framing from building type to details of carpentry. It is shown that changes of method and fashion were in many cases surprisingly rapid, almost abrupt in historical terms. Previous dating criteria for timber-framed dwellings in the county have been refined and new criteria introduced. Clusters of change from the 1440s and the 1540s are shown and some possible historical links suggested.

INTRODUCTION AND METHODS

Around 3600 buildings in Surrey have been recorded by the Domestic Buildings Research Group Surrey (DBRG) (Figs 1 and 2). This paper identifies date-range spans for stylistic features to help refine the dating of timber-framed building in Surrey, one of the main aims of the Surrey Dendrochronology Project. The project began in 2003 and directly funded the tree-ring dating of the 67 buildings that were published in *Vernacular Architecture* between 2004 and 2010. However, through a combination of the interest generated by the project and competitive costs, an additional 78 buildings were privately tree-ring dated by Tree-Ring Services. A further 22 buildings used in this study were tree-ring dated by other laboratories. Another ten were dated precisely by other means.

Only ordinary domestic ‘vernacular’ buildings (categorised here as ‘dwellings’), which were reliably and accurately dated by either tree-ring analysis, well-documented dates or date stone evidence, are included in this analysis. These dwellings have been recorded by DBRG and a ‘Tick-Box’ sheet used to summarise the most common and distinctive ‘key features’. This information was then entered into a purpose-built Building Archaeology Research Database (BARD) and this resource used for subsequent analysis.¹ Whilst BARD provides a useful summary record, there will always be a need to reference original reports, and therefore DBRG building recordings (with drawings and plans) are archived at the Surrey History Centre. Furthermore, the records have now been scanned and are available for emailing, although this facility is at present restricted to building owners and serious researchers.

TERMINOLOGY

To ensure common nomenclature, the Council for British Archaeology (CBA) illustrated glossary of timber-framing terms has been used where possible.² The most common roof type in Surrey is referred to as a ‘queen-strut roof’. In Surrey, it would be more correct to call it a ‘clapsed-side-purlin, queen-strut roof’, but as there are very few variants it has usually been shortened. Most queen-strut roofs have simple pairs of queen struts and are called ‘queen strut 2’ even if they have a third strut in the centre of the outer-wall trusses. However, when the internal trusses also have the third strut, this has been called a three-queen-strut roof (or ‘queen strut 3’). Crown-strut roofs in Surrey are almost always with side purlins. Whilst it might be expected (for example, in Fig. 4) that the total of queen struts, raking queen struts and crown struts equals the total of clapsed purlins, this does not occur due to some dwellings containing two types of roof truss. For example, some buildings contain both two-queen-strut and raking-queen-strut trusses.

The classification of braces has been simplified. Occasionally, braces rising from post to plate are straight or ‘sagging’, rather than arch, and are more properly called ‘up braces’. However, in this early analysis, all such braces have been classified together as ‘arch braces’. Further work could separate the types. This is an area where terminology could be further standardised as there are various terms in use for ‘sagging’ braces.

The CBA glossary is quite comprehensive, but some local terms have been used. Examples include ‘fan truss’ (a combination of a crown strut with curved raking queen struts) and ‘ $\frac{3}{4}$ depth bridled scarf’ (short for a face-lapped, straight-bridled scarf joint of $\frac{3}{4}$ depth) — a surprisingly common Surrey type.

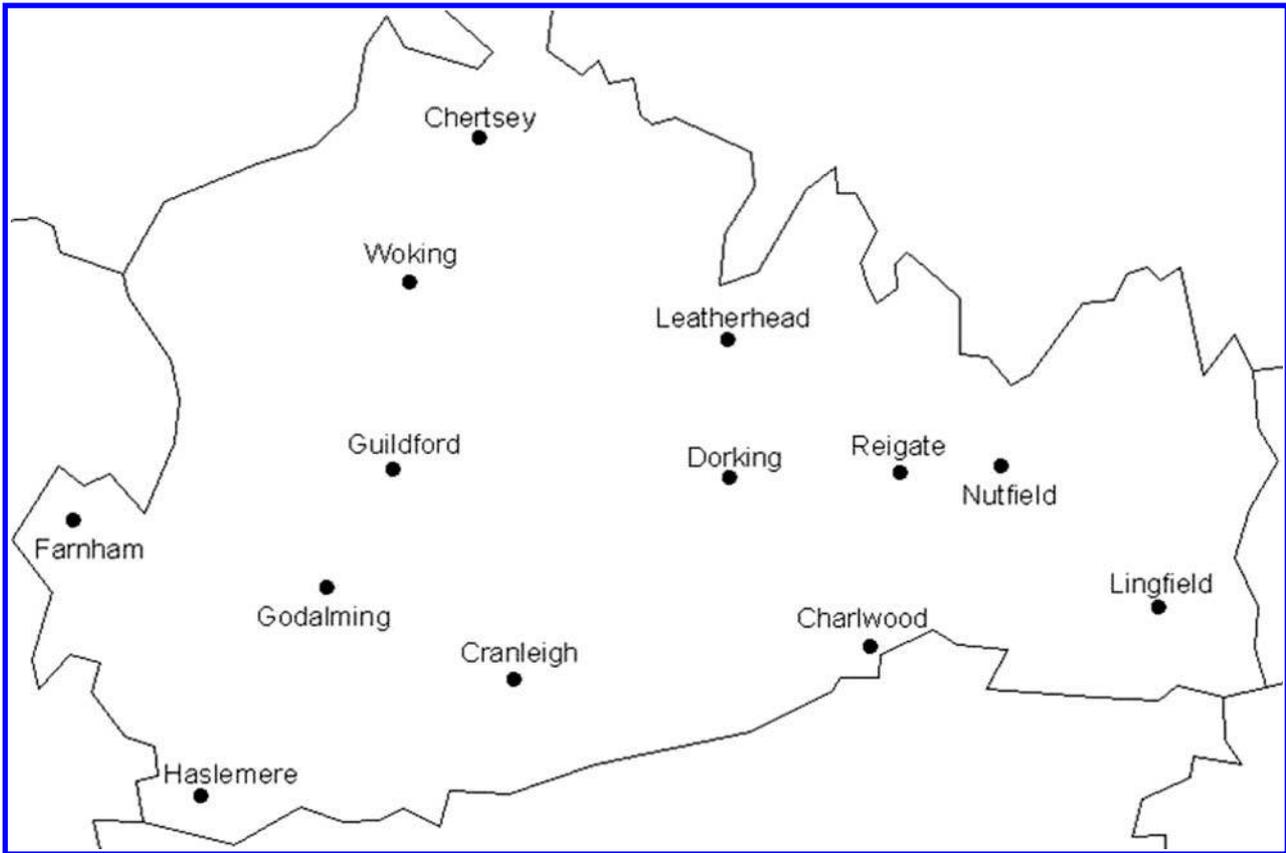


Figure 1. An outline map of Surrey showing the location of some of its towns and villages

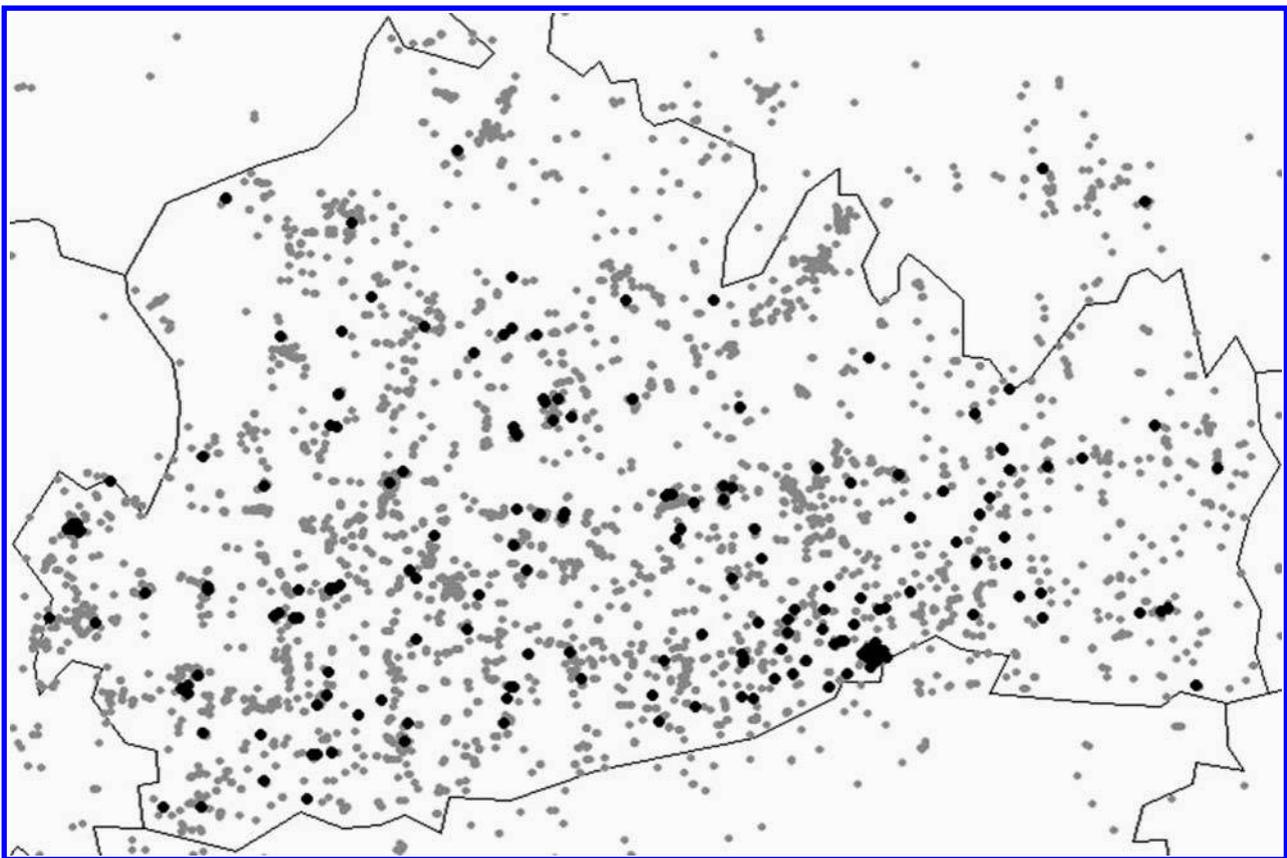


Figure 2. Distribution of all buildings recorded by the DBRG (grey) and those 177 accurately dated dwellings (black)

RESULTS AND THEIR PRESENTATION

A total of 177 dwellings were used in this analysis, of which 147 have precise tree-ring dates, 20 have been assigned the mid-point of a tree-ring date range, eight are dated from documentary sources, and two reliably dated by date-stone inscription (Fig. 3). Two dwellings which are now in Greater London, but were once part of Surrey, are also included. Only ten dwellings were dated before 1400, so there is little discussion in this paper on the features of these earliest buildings. They have markedly different features and require separate analysis. With the help of some datings close by in other counties, work is now being done and results achieved. For the moment, a few notes are given at the end of the Key Features section.

Dating has also been carried out on 20 barns, 18 religious buildings (churches and ‘church houses’) and four detached kitchens, for the most part under the auspices of the project. Again, discussion of these is outside the scope of this paper and they are not included in the statistics or graphics. Some cases of inserted smoke control (new smoke bays, smoke hoods or chimneys) were examined, and 13 successfully dated. Brief mention is made of these.

Some of the more informative histograms are included in this paper. The amount of data has enabled the histogram periods to be very short: decades. Note that these are labelled on the histograms only by the beginning year, for example 1540 meaning the 1540s, or 1540–49.

The calculated date spans for 52 of the key features are shown in Figure 4. They are divided into six groups for further discussion below. The date spans calculated use the 4th to 96th percentiles, so as to encompass at least 90% of the data whilst eliminating outliers. These were calculated and plotted using a ‘box-and-whiskers’ add-in for Microsoft Excel from www.peltiertech.com. The Appendix shows the statistical

detail and additional information such as earliest and latest cases.

Buildings dated before 1400 by the project are few in number and often have quite different features. Accordingly, they are not included in these charts except as ‘prior’. Nor have possible variations of distribution within the county been explored in any detail, although they certainly exist. Such a study would be best done using the wider dataset of all DBRG recorded buildings, and is intended to be the topic of future investigations. However, the dates of features here are compared to some known in neighbouring counties, including Hampshire,³ Kent,⁴ and further afield.⁵

KEY FEATURES

This paper is a summary of the wealth of data available in the Surrey records and only some of the more striking results can be given here. The data in Figure 4 are divided, rather arbitrarily, into six groups for brief comment below.

Building type

A primary feature in the dating of old buildings is the method of heating, with a well-recognised general progression from open hall to smoke bay/smoke hood to brick chimney. The progression is shown in the three histograms of Figure 5, which also illustrate some of the finer divisions. Open halls are shown to have ruled supreme until they stopped being built, quite abruptly, in the 1540s. This date seems to be critical in terms of changes in the timber-framed building tradition, coinciding with the Dissolution of the Monasteries. The changes are believed to reflect the redistribution of wealth away from the Church, and new freedoms of thought as the influence of the traditional Church authorities faded away.

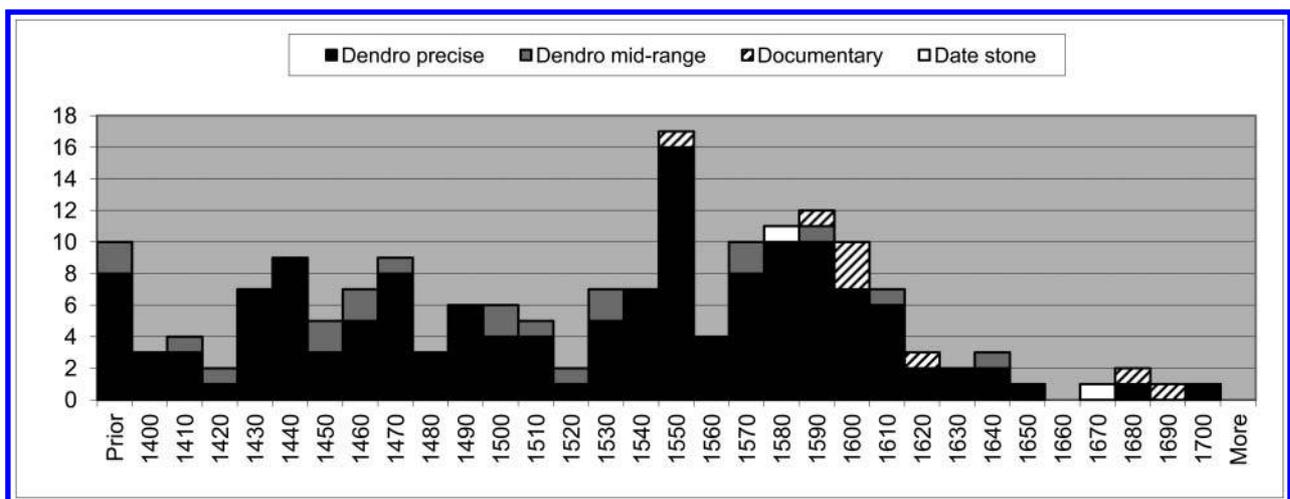


Figure 3. Distribution of dates and method of dating 177 dwellings

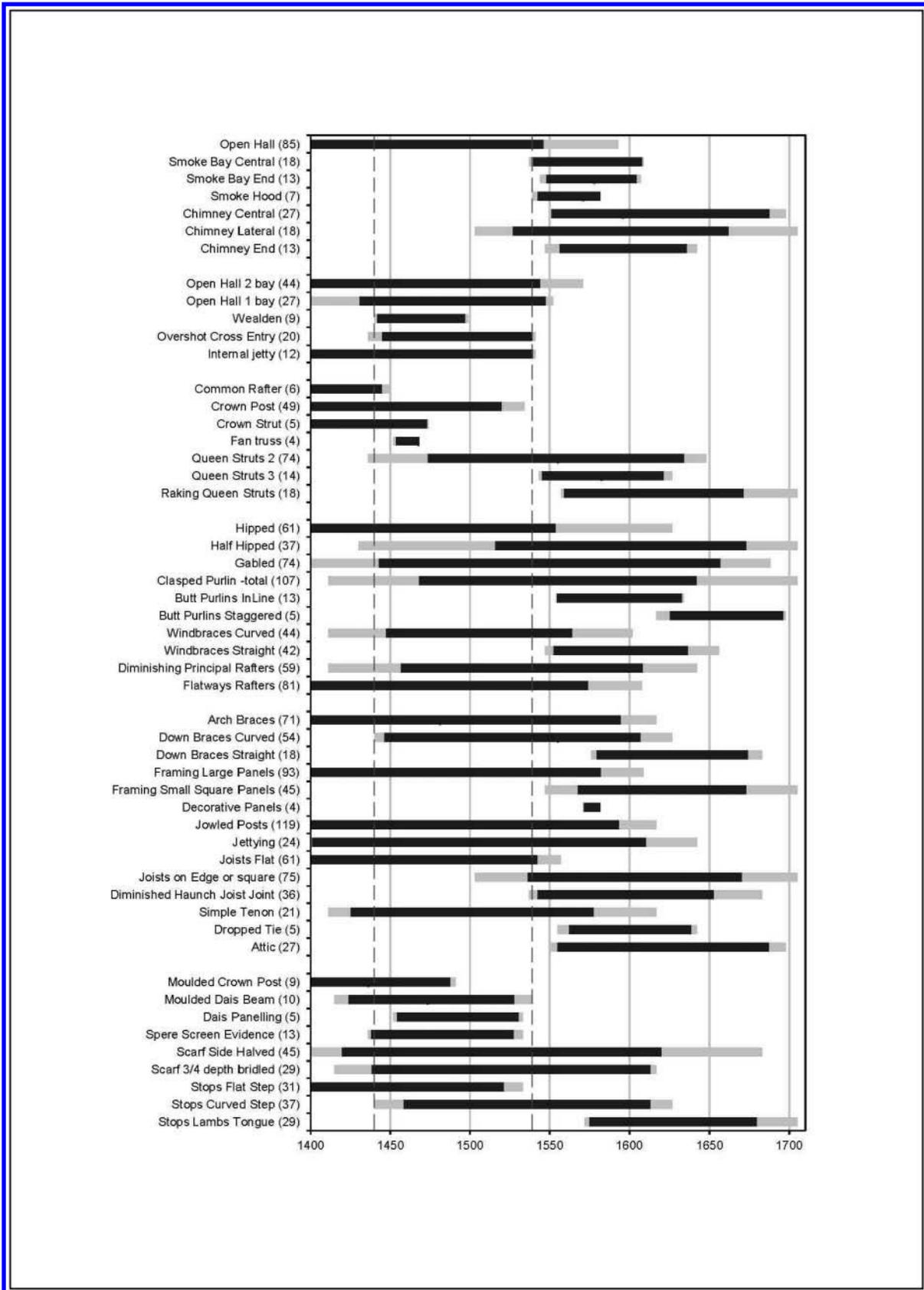


Figure 4. Summary date spans for the key features from 177 dwellings and additions to existing dwellings. The range shown is between the 4th and 96th percentiles, the total range of data is represented by the lighter shade. See Appendix for the groupings and additional information. The start of two apparent periods of change around 1440 and 1540 are highlighted by the dotted lines

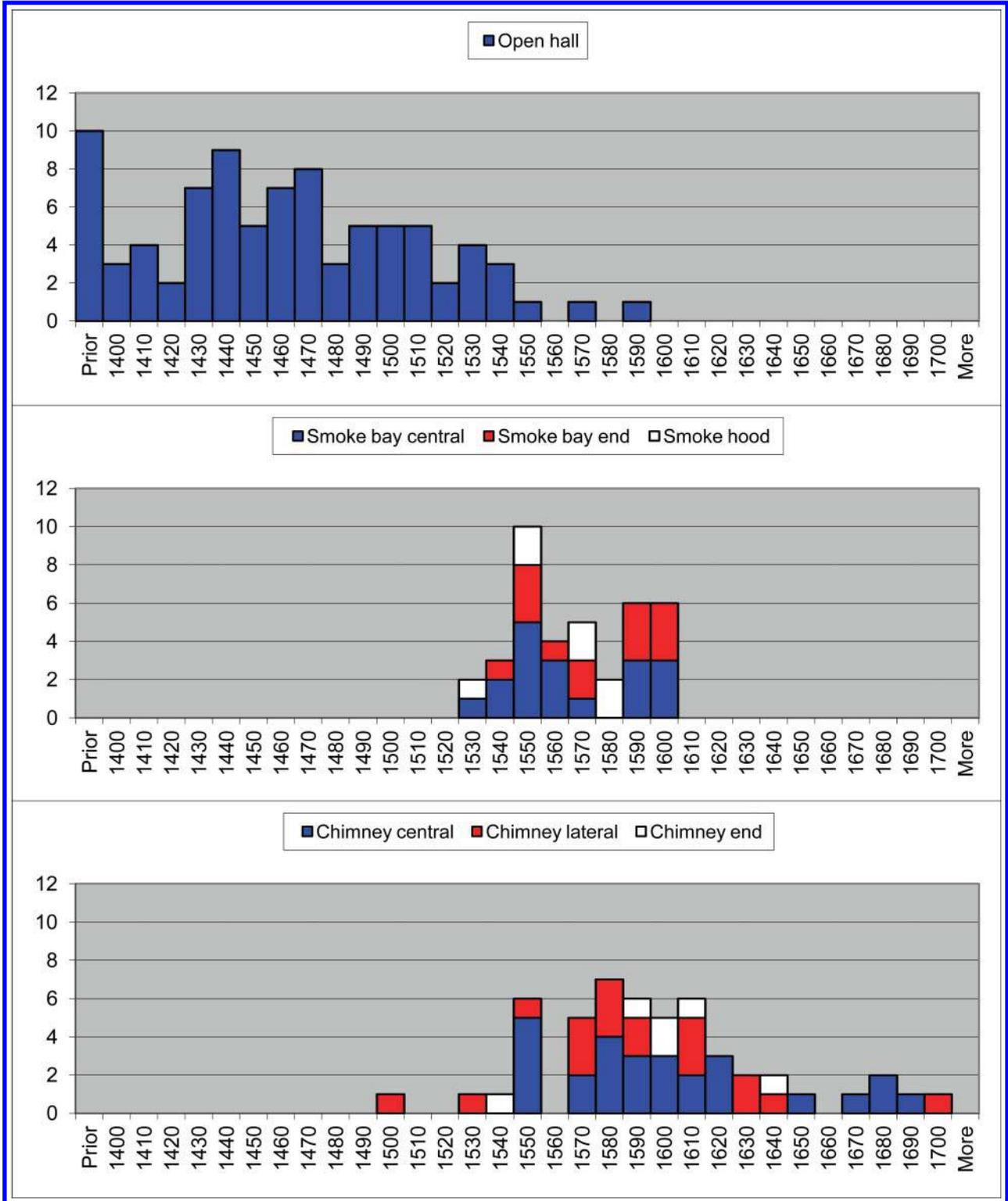


Figure 5. Distribution of smoke control

Floored halls with some form of smoke control in the form of smoke bays, smoke hoods or chimneys, are shown to arrive from about 1500, although these early examples were usually in apparently wealthier houses. Smoke control remains unusual in dwellings until after the Dissolution when such arrangements become commonplace. Some open halls continued to be built

right up to the end of the century, but the last three results in the histogram refer to separate service wings. In that sense, they are better referred to as open-hearth kitchens.

Some of the detailed findings were quite surprising. Smoke hoods were less common than smoke bays, but were evenly spread throughout the period, rather than

being later. Similarly, there is no significant difference in the dating of central and end smoke-bay houses, and they were built in roughly equal numbers. It just depended on whether the house being built was of two or three full-sized bays.

It had been thought that chimneys started to be used at the vernacular level in Surrey around 1600.⁶ In fact, there are plenty of examples much earlier than that, although few before 1540. Once again wealth or an urban setting seems to be a factor. This reflects experience in Hampshire: ‘Timber chimneys don’t pre-date brick ones but are a poor man’s substitute introduced at the same time and phased out as brick becomes more readily available’.⁷ By 1570, chimney houses were being built in equal numbers with smoke bays and none of the latter was built after 1610.

Data were also collected on inserted smoke control: smoke bays or smoke hoods being put into open halls, or chimneys put into open halls or smoke bays (Fig. 6). The changes started in the 1540s and were quickly adopted generally, although a few traditionalists left their open halls unchanged until close to the end of the century. There is even a documented case of ‘a forrest chimney made up of lome and lath which was very dangerous to use and apt to take fire’ being replaced by a brick chimney as late as 1669.⁸

Open-hall plan details

An interesting finding was a date for the arrival of the one-bay open hall, quite crisply about 1440. Figure 7 shows just two earlier cases. The first is Ketleas, Capel, 1389,⁹ a building of only two bays in total, one open

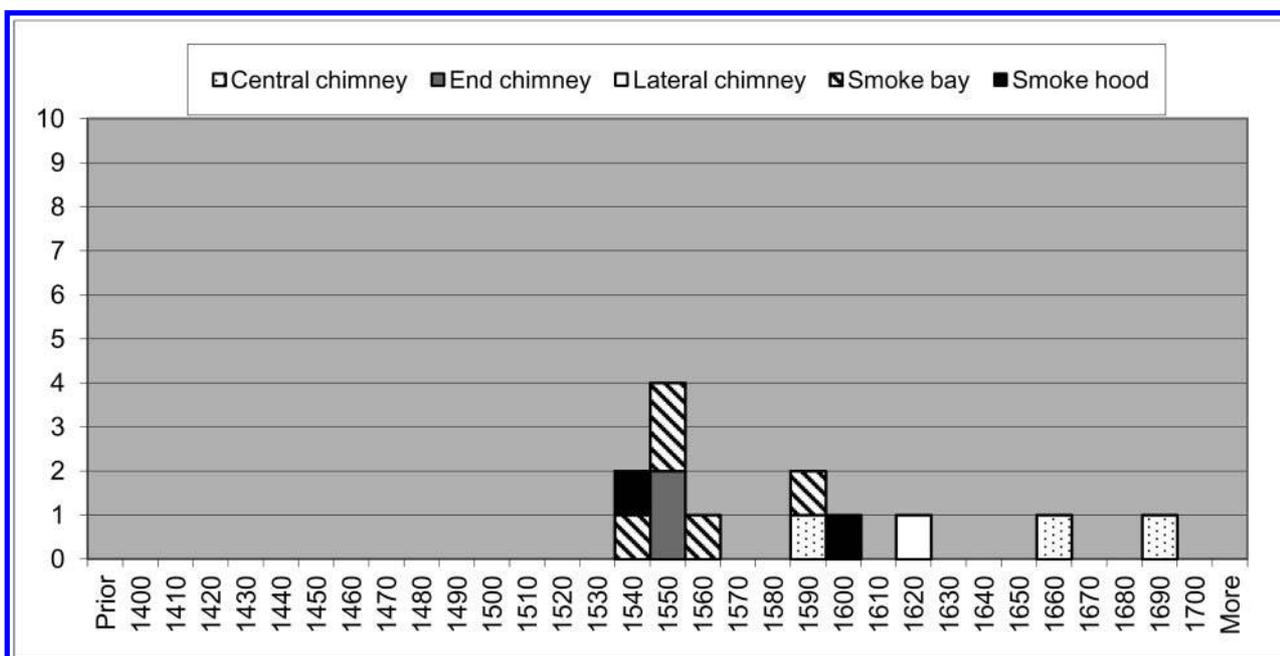


Figure 6. Distribution of inserted smoke control (whether the insertion was into an open hall, smoke bay or smoke hood is not differentiated)

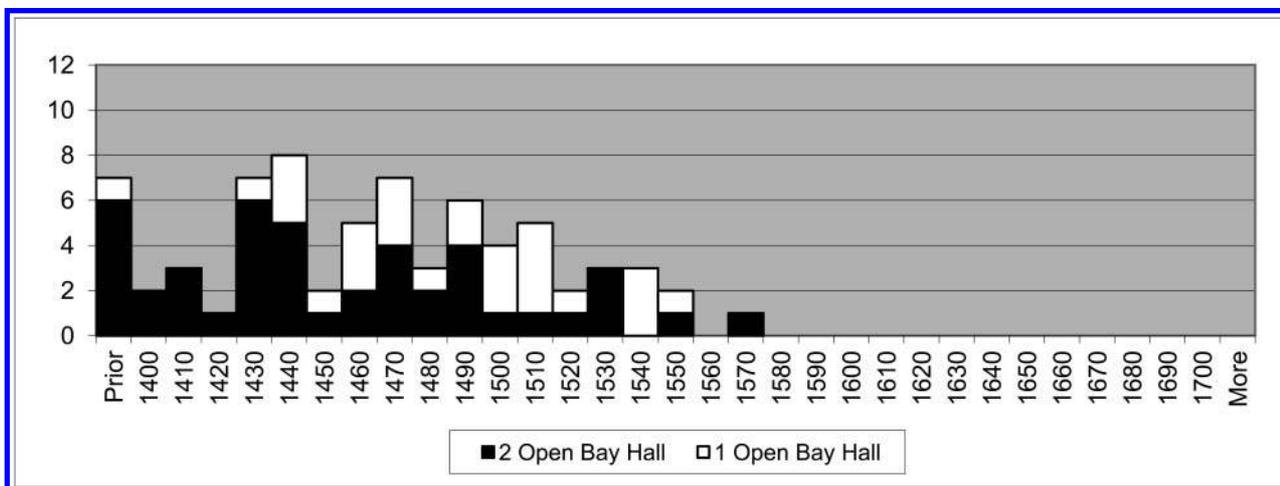


Figure 7. Distribution of one and two open bays in open-hall dwellings

and one floored, a very unusual type that crops up occasionally in Surrey. The second is Walnut Tree Cottage, Frensham, 1430.¹⁰ It is Surrey's only known full-cruck house, seemingly having drifted over from Hampshire, which is only half a mile away and has many crucks. After 1440, roughly equal numbers of one- and two-bay halls were built, until the 1500s when halls with just one bay start to predominate — another useful, if less precise, dating guideline. There was nothing to suggest that one-bay hall houses before 1440 have survived less well for having been less well built. Certainly those surviving with this building plan are not obviously of lower status. They were sometimes made more spacious by the use of overshot cross entries, which started to be used about the same time, and this seems to have sufficed to give enough space for the functions of the hall.

The project dated nine Wealden houses in Surrey. They had a quite narrow date span from the 1440s to the 1490s. This is rather later than in the south-east region as a whole, where they are more evenly spread, ranging from 1340 to 1525, with only a slight emphasis on the second half of the fifteenth century.¹¹ This increase is more pronounced in Surrey, with two-thirds of Wealdens in the last third of the century. This gives some credence to the possibility that the fashion moved into Surrey gradually, as the county opened up. Only two Wealdens have been dated in the sixteenth century, one in Kent and one in Hampshire (*ibid.*). The fashion went away, quite suddenly, at the turn of the century. The latest dated in Surrey was 1–3 Rose Cottages, Lingfield, 1499.¹²

Internal jetties are not commonly found in Surrey (although the evidence is not always easy to see). Of the open-hall houses sampled, barely a tenth had them. Despite giving a little more space to the hall, their purpose was primarily decorative and to give status to the high table. Before 1440, they were with two-bay

halls, because two-bay halls were the rule at that time. After that they were used almost wholly in one-bay halls, where the extra space would be more useful. Otherwise, the pattern is strange. All but two were built before 1480, but two were much later: Langmans, Woking, 1538,¹³ and Whitmeads, Cranleigh, 1541.¹⁴ These last two are amongst the very last open-hall houses to be built in Surrey. It is interesting that even in the death throes of the fashion, this refinement held on. The apparent drop out of use after 1480 until the last two examples is hard to explain and may need to be confirmed by more data.

Overshot cross entries are more common than high-end internal jetties. They were useful in augmenting the space of one-bay halls, although used almost as often in two-bay halls. They arrive in the 1430s but, surprisingly, in central Surrey most of them dated to the declining years of the open hall — the sixteenth century. They did not usually have a corresponding internal jetty. This is all in curious contrast to east and west Surrey where all the examples are fifteenth-century and, for the most part, with internal jetties. There are regional differences here that need to be explored.

Roof trusses

The basic Surrey sequence for roof trusses is common rafter to crown post to queen strut to raking queen strut (Fig. 8). Six common-rafter roofs were dated by the project in the range 1254 to 1449. It had been thought to be a thirteenth- or fourteenth-century feature,¹⁵ but the spread into the fifteenth is quite clear. This compares with experience in Kent, where it persisted until the sixteenth century in simple houses.¹⁶ In Hampshire, it is only found in a few fourteenth-century houses.¹⁷

The crown-post roof dominated later medieval buildings in Surrey. The earliest dated is Greens Farm,

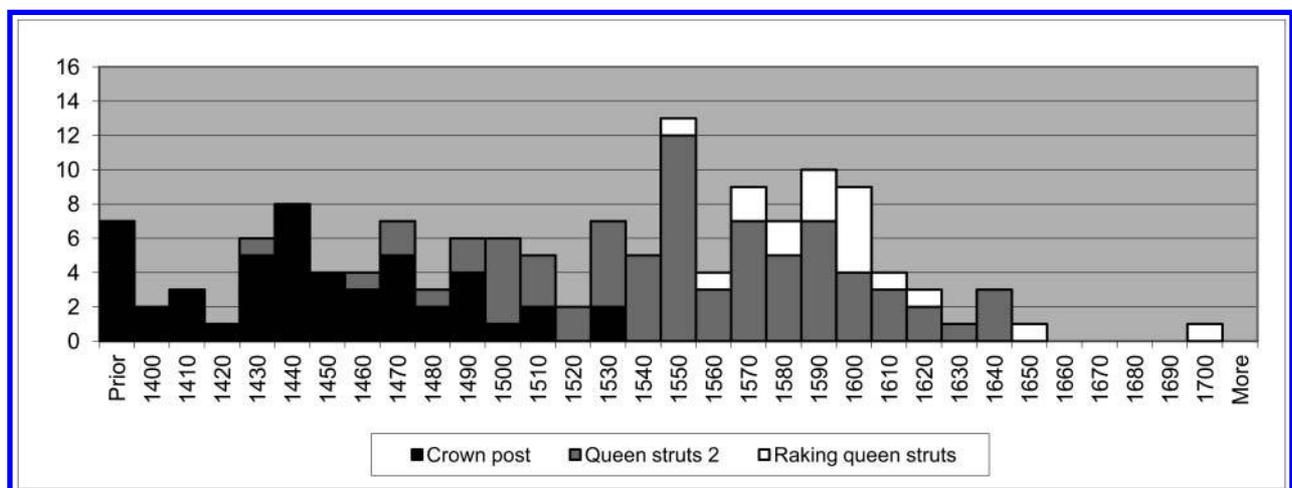


Figure 8. Distribution of the most common roof trusses

Newdigate, 1309,¹⁸ and the latest Hillands, Charlwood, 1533.¹⁹ Only in the sixteenth century did it start to lose its pre-eminence. Clasped-side-purlin roofs had come in with the crown strut, the earliest dated example being the Old Parsonage, Thursley, 1411.²⁰ (An early form of crown strut, without side purlins, is represented in Surrey by just one dated example, Taylors' west wing, Capel, 1345,²¹ but other examples, including churches, are known.) In a few west Surrey houses, the crown strut became the fan truss by the addition of raking queen struts, giving an attractive 'butterfly' effect. Four Surrey examples date in a narrow range between 1452 and 1468. It is more common in Hampshire where nearly all the dated examples are in the 1440s, a slightly earlier range.²² This could be another example of Hampshire fashions drifting across the border.

However, around 1450 the side-purlin queen strut roof had come rapidly into predominance in Hampshire (*ibid.*). West Surrey has a similar pattern, with one early example (Ridgeway Farm, Thursley, 1436)²³ followed by a few more examples during the rest of the fifteenth century. Most of Surrey caught on to the method later, about 1500, when the change from crown post to queen strut was quite dramatic. Thereafter, the queen strut was the main roofing truss for at least the rest of the century. Not shown in Figure 8 are 'three-queen-strut' trusses (queen struts 3 — see 'Terminology'). These arrive in 1540 and thereafter are a minority compared with 'queen struts 2', without any noticeable dating differences.

The 1440s mark an apparent period of considerable change in the timber-framed building tradition. The arrival of the one-bay hall has been noted and now (except in the sleepy Wealden areas) the clasped-purlin roof makes its entrance. This was accompanied by a new approach to a number of aspects of roof construction, framing and carpentry (see later sections). Building rates across the country — based on the tree-ring dating results of buildings that survive — appear to show a quite rapid increase from the 1430s,²⁴ and this gets some backing in the Surrey data in Figure 3 above. The dating of more early buildings would be needed to clarify this period of change, but it coincides with a period when medieval guilds flourished. Carpenters' guilds may have not only helped ensure high standards and high quality of work, but also encouraged improvements. The Carpenters' Company, a leading London livery company, commenced the building of its hall in 1429,²⁵ but there is little doubt that it existed as a guild for a considerable period before the hall was built. Henry VI (reigned 1422–61) continued the career of architectural patronage begun by his father (Henry V, reigned 1413–22). One of Henry VI's lasting achievements was his fostering of education in founding both Eton College and King's College, Cambridge, with their remarkable chapels.

The next truss type is the raking queen strut. This trickles into use from the 1550s — another post-Dissolution change — without at first matching the normal queen-strut method in numbers. After 1600, the data are too limited for conclusions to be drawn, but the general observation is that the queen strut and raking queen strut are roughly equally popular for the rest of the timber-framing period.

The quite rapid changeovers between the different roof and truss types make them useful features in dating, particularly when allowance is made for the differences between the western fringes of Surrey and the central and Wealden areas.

Roof framing and carpentry

The sequence of roof shape is hip to half-hip to gable. It reflects the changes in roof-truss type. Open halls were hipped with gablet. The clasped-purlin roof invites a half-hip construction and this duly arrives, although some builders hung on to the full hip for a surprisingly long time. Almost the latest-dated full hip with side purlins is the Old Cottage, Old Woking, 1555.²⁶ It was hipped at the service end only, but a half-hip gave extra headroom to the parlour end — the master's chamber. There is one exceptionally late-dated full hip — the kitchen wing at Ridgeway Farm, Thursley, 1627 (*op. cit.*).

Gables had been used for a long time for some town houses, cross wings and for end-hearth buildings, but in the seventeenth century they became the dominant form. This was for the most part due to the use of brick, although some builders started to use gables in timber-framed buildings. Coldharbour Farmhouse, Cranleigh, 1683,²⁷ is timber-framed but also gabled at each end, as well as having a forward-facing gable — an attractive feature.

Butt-purlin roofs are unusual in Surrey, only thirteen in-line and five staggered were dated. They were all post-1550. In higher-status buildings, butt side purlins in-line occur sporadically much earlier, from about 1400 but, at a vernacular level, they are shown here to be a narrow-span dating feature. They become a little more common from 1550, although again in rather wealthier buildings such as Castle Arch, Guildford, 1554,²⁸ and Temple Elfande, Capel (1572).²⁹ Around 1570, they begin to be used in lower-status buildings with dated examples up to about 1630. They are always in a minority, however, compared with the queen strut (with which they are often combined in some way). In both Kent and Hampshire, butt-purlin roofs are thought to be uncommon before the seventeenth century.³⁰ From about 1570, the staggered butt-purlin roof comes into use, slowly gaining in popularity until, after 1650, it becomes a common roof form alongside the queen-strut roof. Most staggered butt-purlin roofs in timber-framed buildings are

seventeenth-century (not necessarily late seventeenth-century as previously believed). The style continued in common use in brick buildings in the eighteenth century.

Trenched purlins are almost unknown in Surrey, although they are common in many parts of the country. The only example dated by the project was Surrey's only full-cruck house, Walnut Tree Cottage, Frensham, 1430 (op. cit.), which had them as would be expected.

The most striking result in the roof-framing section concerns the almost abrupt straightening of windbraces. Prior to the 1550s, curved windbraces were the norm, but from this date straight windbraces come into use over most of Surrey, and became almost universal by the 1570s (Fig. 9). This is an astonishingly accurate dating criterion. Out of 44 curved-windbrace buildings dated, all but two are before 1570. Out of 42 straight-windbrace buildings dated, all but seven are after 1570 and all but two after 1550. This is another example of the changes that arrived soon after the Dissolution. Both of the two late cases of curved windbraces are in higher-status buildings. One is a highly decorative cross wing at Jordans, Eashing, 1575,³¹ which proudly and perhaps nostalgically displays a full set of 16 curved windbraces.

An example of the value of the windbrace criterion is demonstrated by a wing at Ridgeway Farm in Thursley (op. cit.) dated at 1627, but with curved windbraces. On checking the case, the windbraces were found to be smoke-blackened and, as the wing was heated by a chimney, the braces must have been re-used from an earlier building.

Common rafters may be of square or rectangular section. 'Flatways' rafters (common rafters laid with their long sides in the plane of the roof, as distinct from square or on-edge) have been thought of as

medieval and a characteristic of open-hall houses. This is generally true but not reliably so, as a few dated examples are much later, the latest dated being Nyes Place, Newdigate, 1608.³² Most open halls have flatways rafters and crown-post builds certainly do, but side-purlin open halls need not. Most side-purlin roofs in any building type have rafters set square or on-edge, but again not reliably so.

The technique of diminishing principal rafters above the purlins was used for all crown-strut, fan-truss, queen-strut and raking queen-strut roofs, from their introduction. Over most of Surrey, the change to notched principal rafters was another remarkably sudden switch, about 1580. After that, there are only a few examples of diminishing principals, with one as late as 1642. The first dated example of the notched type is in 1560, but they are more numerous than the diminishing pattern in the 1580s and beyond (data not shown in Fig. 4). Further sampling may show more variation, but the change does appear to have been rapid.

Wall and floor framing

A general understanding in Surrey that down braces are later than arch braces has been shown to be too simplistic (Fig. 10). The project recorded only arch braces in buildings assembled before 1440, but when the down brace arrived it did not replace the arch brace. In the same way that the new one-bay hall did not displace the two-bay hall, the two types of wall brace were about equally popular until the 1550s. From then on, the down brace dominates — another aspect of the quite rapid change coming soon after the Dissolution. Not only that but, just as windbraces straightened in the period 1550–70, so did wall braces, but not until a little later, the first occurring in 1576 (Chennells, Dunsfold).³³ The delay may have been due

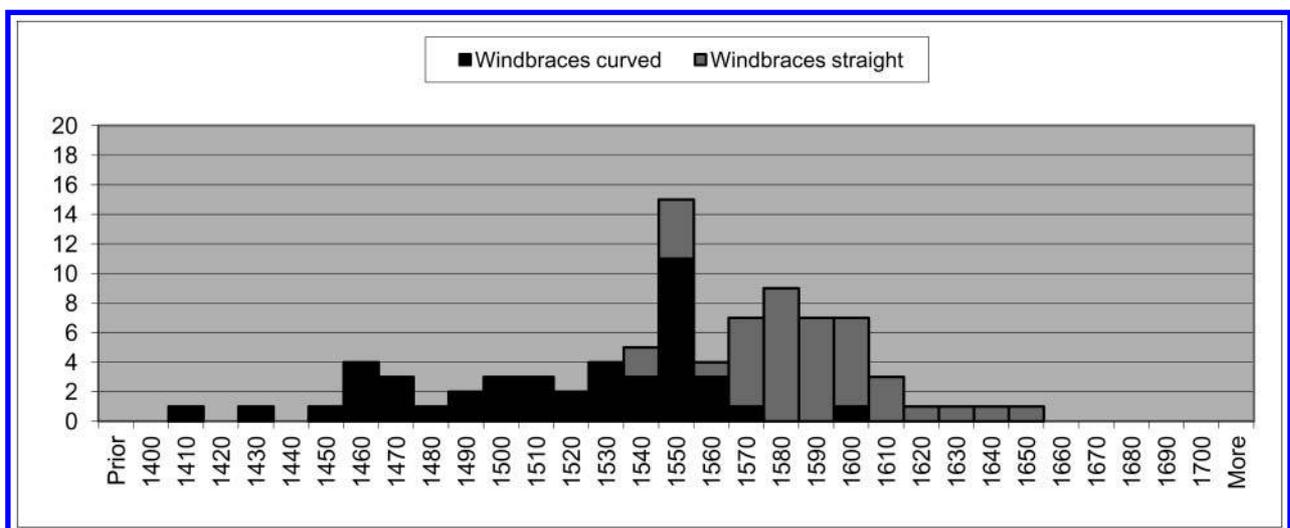


Figure 9. Distribution of windbraces

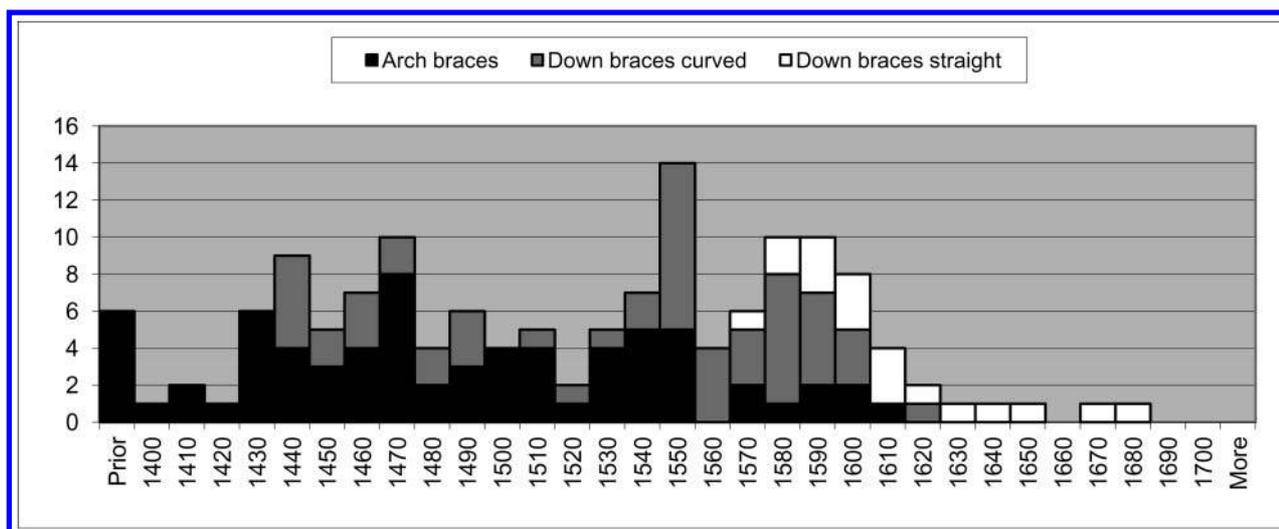


Figure 10. Distribution of wall braces

to wall braces being decorative from the outside, unlike windbraces hidden behind roof cladding. The curved down brace dragged on in minority use until the end of the century, but is almost unknown in the project's seventeenth-century datings. Hampshire straightened its braces in much the same way, but does appear to have started the process a little earlier, with examples throughout the second half of the sixteenth century.³⁴ Once again, the advancing influence of the Diocese of Winchester is suspected. Kent certainly had earlier down bracing than Surrey, with the well-known 'Kentish Bracing', pairs of large curved down braces set decoratively.³⁵

Small square panels, 1m × 1m approximately, are a common feature of post-medieval houses. The earliest example is 1547 (Barlings, Farnham)³⁶ and after 1570 they are the rule (Fig. 11). This is yet another sharp

change and earlier than expected. The style had been thought of as being seventeenth-century. Due to this and other surprising results, the project had a joke that 'the seventeenth century started early in Surrey'. During the rest of the sixteenth century, there are imperfect examples of the small square-panel style, as quite large diagonal braces have to be accommodated. However, in the seventeenth century, with short straight braces, or no braces at all, there are strong midrails across each storey and an unblemished pattern of squares. The early dating in Farnham is no surprise, as nearby Hampshire examples can be early.³⁷

Regions such as the Welsh Marches have some hugely complex and decorative timber-framed frontages. Surrey has a few so-called square-and-circle frontages that compete quite well and four have been

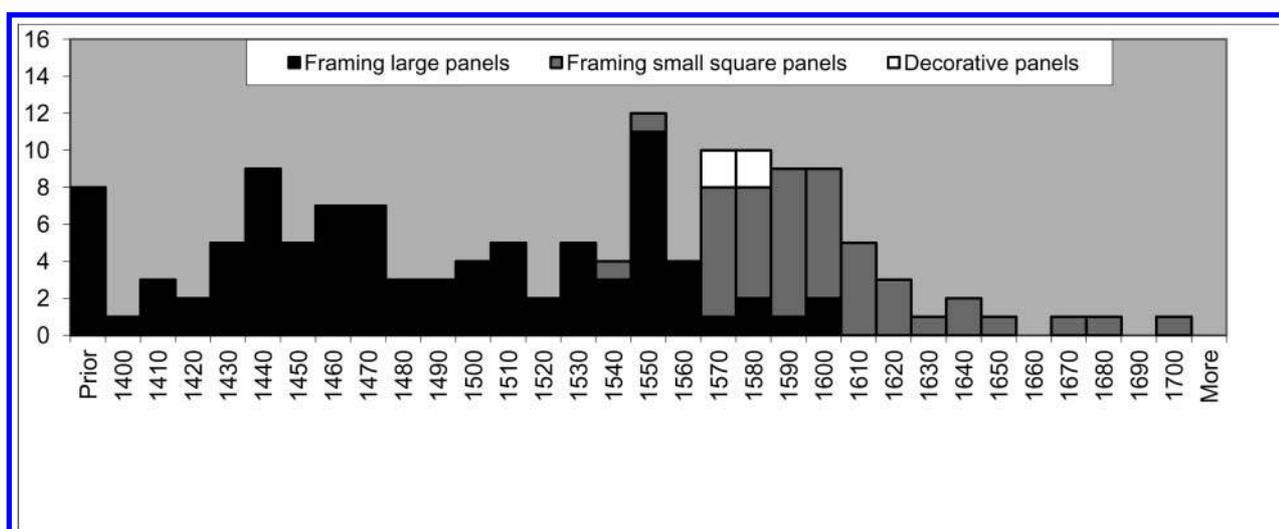


Figure 11. Distribution of wall-framing panels

dated. They were in an astonishingly tight range, 1571–82. It was a beautiful but brief Elizabethan flowering, seemingly doomed to a short life because of expense and maintenance difficulties — or perhaps it was just a passing fashion.

Some very early buildings have posts without the jowl swelling. The project dated three: Forge Cottage, Dunsfold, 1254,³⁸ Brook Farm, Westcott, 1407,³⁹ and Barhatch Farmhouse, Cranleigh, 1429.⁴⁰ Apart from these, it has often been said that jowled posts — enabling that splendid three-way junction with wall plate and tiebeam — lasted until they fell out of use about 1600. Figure 12 shows this to be reliable, but the changeover was not sharp. The project has shown that houses without jowls were being built as early as 1548 (Old Pound Cottage, Chobham).⁴¹ Then, from about 1560, there is almost equal use of the two types for the rest of the century.

Figure 13 shows that flooring joists changed from being laid flat to being set square or on-edge about 1540 — another example of the changes that came in apparent unison soon after the Dissolution of the Monasteries. It mirrors the change from open to floored halls that happened in Surrey at this time, though there are occasional examples of open halls with on-edge or square-set joists in their floored bays, and of floored halls with joists laid flat. The work in Hampshire agrees the timescale for the change and gives detailed measurements.⁴²

The diminished-haunch tenon came into use in Surrey in the 1540s and, with the exception of one simple-tenon case in 1617 (Smallfield Place, Burstow), became the rule from the 1570s. The earliest date for this tenon in Surrey is 1537 (Barlings, Farnham, op. cit.), but Hewitt attributes the joint to Master Richard Russell at King’s College Chapel at Cambridge in

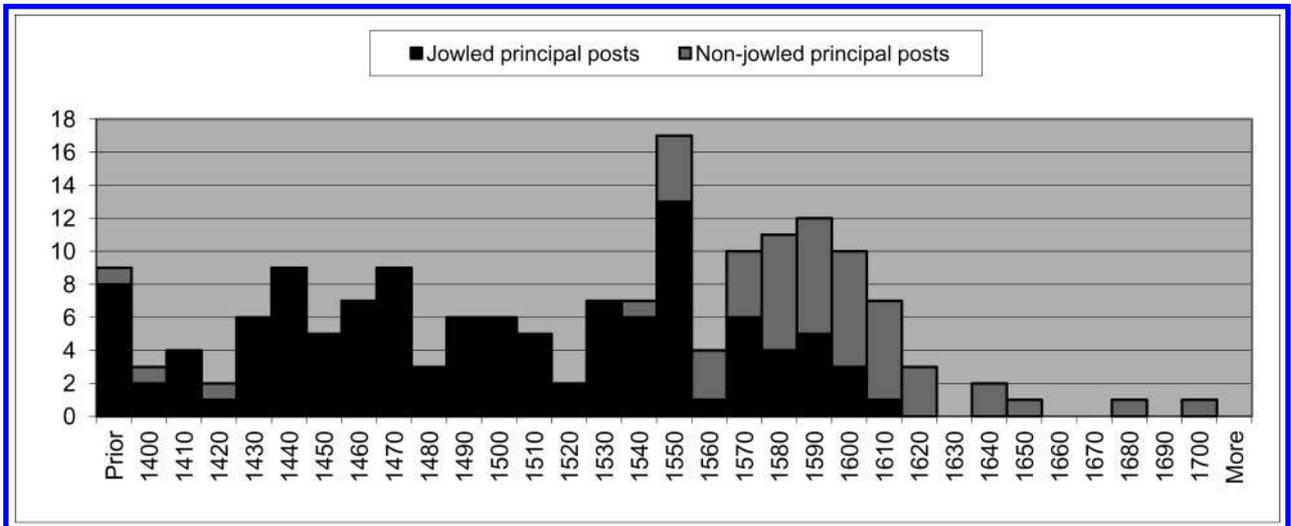


Figure 12. Distribution of jowls

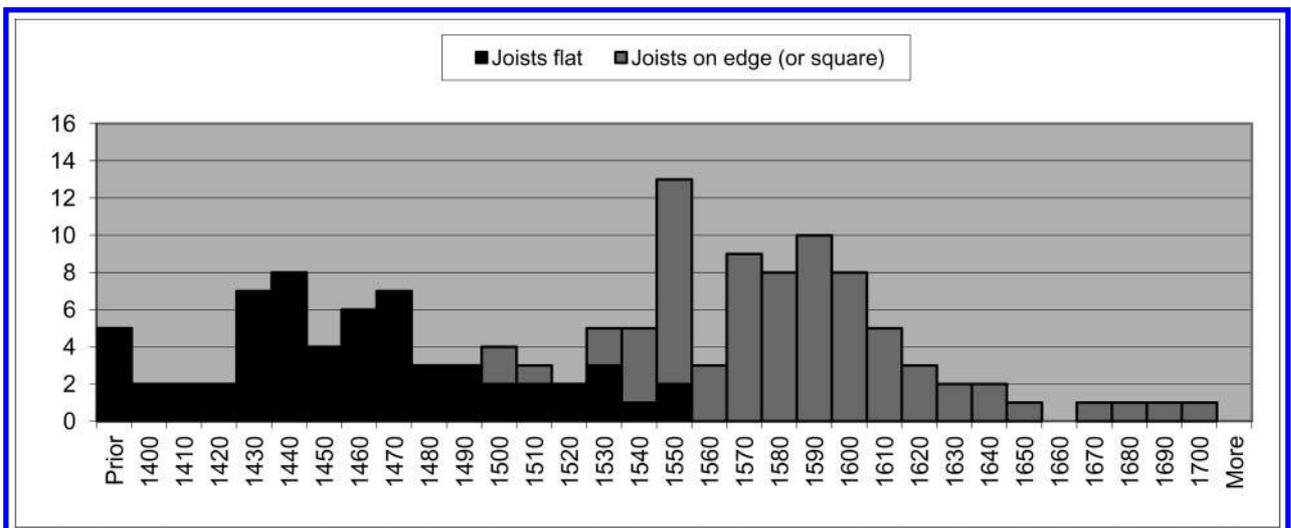


Figure 13. Distribution of the orientation of joists

1510–12.⁴³ The CBA calls the type a ‘barefaced soffit tenon with diminished shoulder’.

Spurred tenons are almost unheard of in Surrey but one was dated (40–4, High Street, Nutfield, 1551).⁴⁴ This example is a ‘central tenon with a spurred soffit’. They might be more common as they are not usually easy to see.

Proper attics, designed to be used from the beginning, rather than added later, are post-1550 (Fig. 4). Noteworthy is Brittleware, Charlwood, 1555,⁴⁵ which used the space as a granary. The corn bins are still in place. Attics are commonplace after 1570, once again earlier than expected, a product of the post-Dissolution changes rather than being one of those ‘seventeenth-century features’. After 1600 they are almost the rule, but there are plenty of earlier examples.

Dropped tiebeam construction is designed to give more space to an attic. It occurs occasionally in the post-medieval period. In quite a small sample, most are seventeenth-century, which is perhaps to be expected. One example dated as early as 1555, which is more of a surprise. It occurs at Brittleware, the house just mentioned.

Carpentry

High-end decoration associated with open halls, such as moulded dais beams and dais panelling, indicates wealth and is not frequent in Surrey. These features are scattered throughout the open-hall period with an apparent tendency to be after 1450 rather than before. It is interesting that they continued to be used just as frequently even in the declining years of the open-hall period in the sixteenth century. Hillands, Charlwood (op. cit.) has fine dais panelling at 1533, and Lower Springfield Farmhouse, Westcott,⁴⁶ has a moulded dais beam at 1539. In contrast, moulded crown posts are decidedly earlier, with all but two of nine dated

examples before 1460, and none in the 1500s. Decoration over and behind the high table — indicating status — seems to have mattered more than decoration high in the roof over the hall.

Another interesting result is that of thirteen dated cases of ‘spere screen evidence’, all of them are after 1430. It can hardly be that the spere was invented at that time, but it does coincide with the arrival of the overshoot cross entry (see ‘Open-hall plan details’ above). This is no surprise as the overshoot invites the construction of a spere. In only one case was the spere still in place — a dais spere at Brewerstreet Farmhouse, Bletchingley, 1491.⁴⁷ All the other cases were evidence of cross-entry speres.

The earliest scarf joint in the survey is the ‘through-splayed and tabled scarf’. Just three examples were dated by the project: Greens Farm, Newdigate, 1309 (op. cit.); The Old House, Capel, 1374;⁴⁸ The Cottage, The Street, Charlwood, cross wing, 1402.⁴⁹ The dominant scarf joint in the survey was the side-halved scarf. The earliest dated example was Burstow Manor, Burstow, 1334.⁵⁰ The type quickly superseded the splayed scarf and kept being used right the way through to at least the late seventeenth century. From the 1440s, the ‘face-lapped, straight-bridled scarf joint of three-quarter depth’ occurs in roughly equal numbers with the side-halved scarf and continues to be used until 1617 (‘Scarf 3/4 depth bridled’ in Figure 4). Such equal popularity is surprising for such a little-known scarf, perhaps a Surrey speciality. As a result of their wide and overlapping spans of use, both these types of scarf are poor dating features in Surrey. The face-halved scarf is the widely accepted successor to the side-halved scarf. Only four examples were found in the survey, all after 1580. The latest dated example is at Great House Barn, Hambledon, 1751,⁵¹ by which time it may have been the dominant scarf, but there is

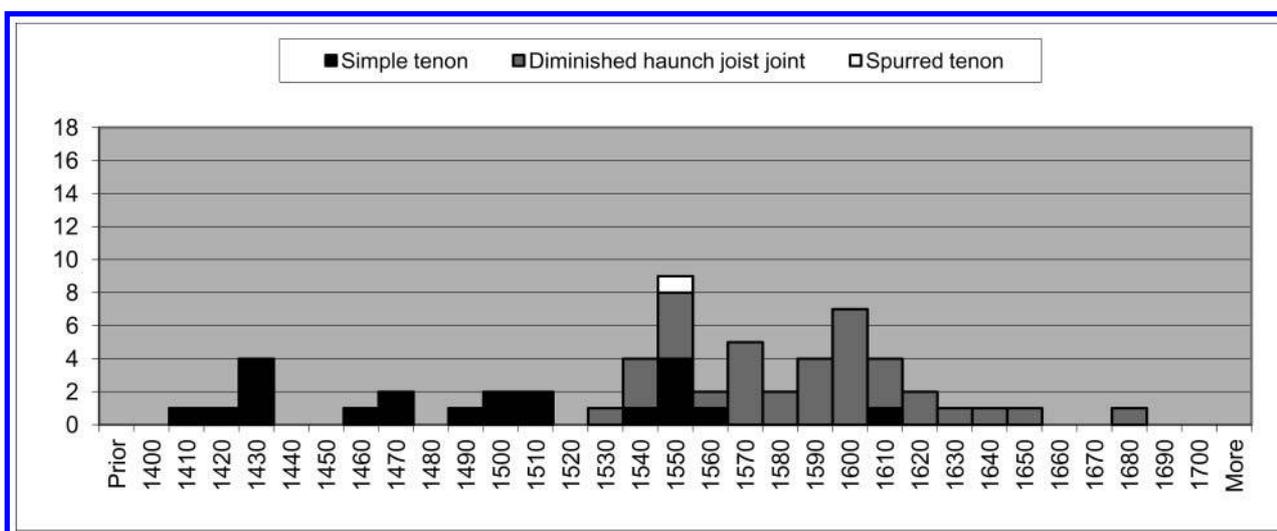


Figure 14. Distribution of joist joints

too little project data from the eighteenth century to be sure.

The sequence of chamfer stops in Surrey is flat step to curved step to lamb's tongue (Fig. 15). Flat-step stops were almost the rule until the latest one dated in 1533, at which point there is an abrupt change to curved-step stops, this almost exactly mirroring the equally sudden change from open to floored halls. This is confirmed by the remarkable fact that only three of the 85 open halls in the survey had the curved-step stop and no floored halls had flat steps. The curved-step stop gradually gave way to the more artistic lamb's tongue (ogee) stop from the 1570s. The earliest lamb's tongue stop in the survey was at Temple Elfande, Capel, 1572 (op. cit.). It had been thought to be a seventeenth-century stop,⁵² so this is another example of the seventeenth century 'starting early in Surrey'. There are other types of stop, including some best described as 'transitional', which can be confusing, but in general the type of chamfer stop is a useful dating aid.

Very early buildings — before 1400

Not many of these buildings seem to have survived in Surrey, and the focus of the study was to cover all periods. Only ten datings were found to be before 1400. With such sparse material, accurate statistical analysis is not possible. There are some simple conclusions, mentioned previously but now very briefly summarised. The dates given are approximate and conclusions tentative.

Just one house was dated to the thirteenth century: Forge Cottage, Dunsfold, 1254 (op. cit.). This is an aisled hall with a host of thirteenth-century features. Carved aisle posts remain, and the roof is scissor braced. There is evidence of duplicate bracing, dragon ties and notched lap joints. Into the next century, the

first crown post arrives at Greens Farm, Newdigate, in 1309 (op. cit.). This also has archaic features, including dragon ties and a through-splayed and tabled scarf. A huge open truss has fine roll moulding and spandrel struts to the posts.

The crown-post roof slowly overtakes the common-rafter roof, although it does not wholly replace it until the early 1400s. Braces are heavy, straight and square in section until about 1350, after which they change quite quickly to being curved and more blade-like. Spandrel struts are another good indicator of a pre-1400 dating, being used more often than not in the 1300s, with none dating after 1374. Splayed scarfs were common early in the 1300s, but were gradually replaced by the side-halved scarf in the period 1330–1400.

By about 1400, these archaic features had largely disappeared, and the more familiar carpentry of the fifteenth century, as discussed in previous sections, was in place.

CONCLUSIONS

For the first time, date ranges are calculated for a wide range of 'key' stylistic features in accurately dated, timber-framed buildings. In this instance, 52 key features from 177 timber-framed dwellings in Surrey are examined. Tree-ring dating was used in nearly all cases, augmented by a very few documentary or date-stone cases thought to be reliable. It has been possible for the dating criteria for the county to be substantially refined, not only because of the number of buildings dated, but also because of the methodical recording of building details and the consequently structured analysis.

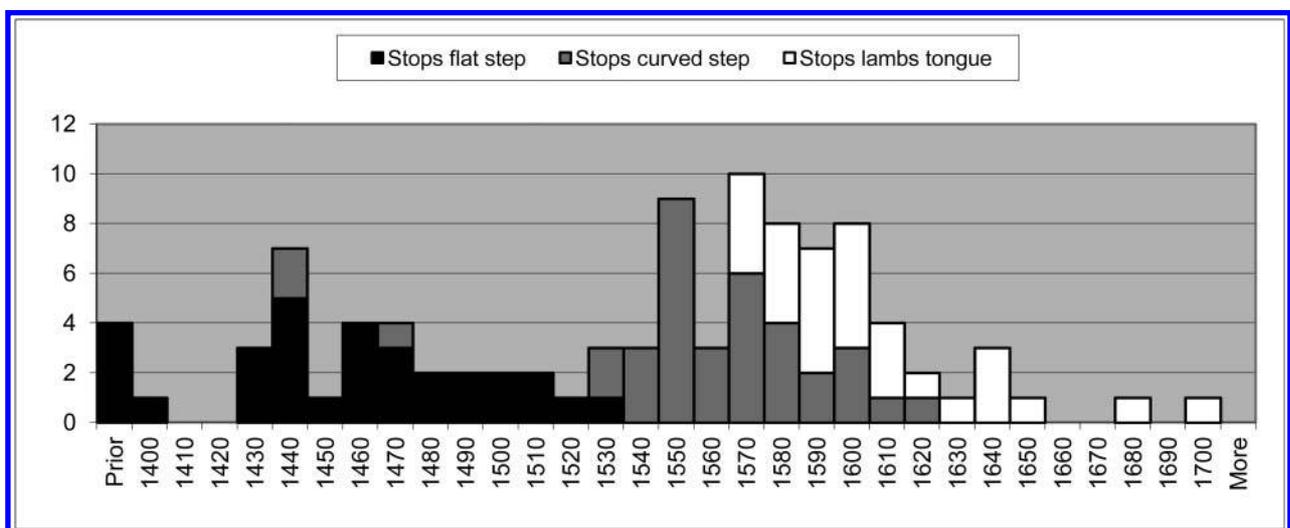


Figure 15. Distribution of chamfer stops

The most surprising aspect of the results is how suddenly fashions changed. Time and again, a feature or method was dropped in favour of a successor within a generation. Open halls are floored. Ceiling joists turn from flat-laid to vertical on cue. Windbraces suddenly straighten, followed by wall braces. Chamfer stops change in a crisp sequence. Fashions, such as the Wealden, stop quite abruptly. Innovations, such as the diminished haunch joint, gain popularity rapidly. Decorative frontage panels come and go, it would seem, in little more than a decade. At times, it almost seems hectic. It was not, of course, but the pace of change does surprise, at least in comparison with intervening quiet periods.

Why should some periods be innovative and others uneventful? The wealth of data has thrown up the interesting possibility of there being two main periods of change within the study period, occurring from the 1440s and then from the 1540s. In both cases, aspects of building plan, roofing, framing and carpentry seem to change almost in unison. The first period coincides with the flourishing of the medieval guilds and the architectural patronage of Henry VI (reigned 1422–61). The second follows immediately after the Dissolution of the Monasteries (1536–40) and the huge changes in wealth and influence that resulted. Both of these, and particularly the last, seem to have caused something of a renaissance in thinking and method.

By its very nature, the Surrey Dendrochronology Project is a tool for future work. It has established precise dates and a taxonomy for more than 200 of Surrey's old buildings (dwellings and other categories). The intention is to carry the method and information through to a more comprehensive study of the 3600 buildings recorded by DBRG in Surrey.

The project has shown the potential of methodical tree-ring databases for research, not only locally, but also nationally. For this to be successful there is some way to go in terms of the standardisation of terminology and which features, out of a myriad, should be the centre of attention. The BARD database started in Surrey, but is being used in Sussex and Hampshire, and elsewhere. At present, it contains data fields for more than 100 features in nine broad timber-framing categories. There are additional fields for brick buildings. Although it has a general usefulness, it is at its best with tree-ring data, where the key-features listings in date order come into their own. BARD may or may not be a key player in national terms, but the philosophy of combining tree-ring results with databases, preferably on-line, is surely the future for vernacular architecture research. There are already good beginnings in this type of tree-ring based, country-wide analysis in Alcock's work on Wealdens, and also in work by Meeson.⁵³ The extra detail and structure demonstrated in the Surrey project would make such work much more attainable and wider reaching.

ACKNOWLEDGEMENTS

The work of the many DBRG members that have been involved in the Surrey Dendrochronology Project is gratefully acknowledged. We thank all those householders who allowed their buildings to be recorded and dated. The project was funded by a grant from the Heritage Lottery Fund, by the Domestic Buildings Research Group (Surrey), the Surrey Archaeological Society, the historical societies of Charlwood, Farnham and Nutfield, and the remarkable generosity of householders. Surrey County Council supported the project with resources.

The Project Committee, under the chairmanship of Alan Bott, was very active. Particular mention should be made of Martin Higgins, Historic Buildings Officer for Surrey County Council and the project's expert in vernacular architecture.

BARD at www.buildingarchaeology.co.uk is funded by a partnership of the Domestic Building Research Group (Surrey) and Tree-Ring Services, and contains an archive of all the buildings used in this study.

REFERENCES

- 1 A. K. Moir, R. Wild and R. Haddesley, 'An internet-accessible Building Archaeological Research Database (BARD)', *VA* **43** (2012), 1–6.
- 2 N. W. Alcock, M. W. Barley, W. Dixon and R. A. Meeson, *Recording Timber-Framed Buildings: An Illustrated Glossary* (York: Council for British Archaeology, 1996).
- 3 E. Roberts, *Hampshire Houses 1250–1700: Their Dating & Development* (Hampshire County Council, 2003).
- 4 S. Pearson, *The Medieval Houses of Kent, An Historical Analysis* (RCHM, 1994).
- 5 J. Walker (ed.), *The English Medieval Roof: Crownpost to Kingpost* (Essex Historic Buildings Group, 2011).
- 6 J. Harding, 'Timber-framed early buildings in Surrey. A pattern for development, c.1300–1650', *Trans. Ancient Monuments Soc.* **37** (1993).
- 7 E. Roberts, pers. comm.
- 8 Guildhall Library, MS 128834, vol. 2, 153. Main build: Hillands, Charlwood, 1533, *VA* **35** (2004), 78.
- 9 *VA* **36** (2005), 78.
- 10 *VA* **39** (2008), 119.
- 11 N. W. Alcock, 'The distribution and dating of Wealden Houses', *VA* **41** (2010), 39.
- 12 *VA* **38** (2007), 103.
- 13 *VA* **31** (2000), 112.
- 14 *VA* **40** (2009), 111.
- 15 J. Harding, *Some Features of Early Medieval Houses in Surrey*, DBRG Worksheet (1990).
- 16 P. S. Barnwell and A. T. Adams, *The House Within* (RCHM, 1994), 56.
- 17 Roberts, 2003, 27.
- 18 *VA* **36** (2005), 78.
- 19 *VA* **35** (2004), 78.
- 20 *VA* **37** (2006), 106.
- 21 *VA* **35** (2004), 81.
- 22 Roberts, 2003, 34–5.
- 23 *VA* **38** (2007), 105.
- 24 S. Pearson, 'The chronological distribution of tree-ring dates, 1980–2001: an update', *VA* **32** (2001), 68–9.
- 25 B. Latham, *Timber its Development and Distribution* (George G. Harrap & Co. Ltd, 1957).
- 26 *VA* **43** (2012), 86.
- 27 *VA* **40** (2009), 110.
- 28 *VA* **38** (2007), 102.
- 29 *VA* **35** (2004), 81.

- 30 Pearson, 1994; Roberts, 2003.
 31 *VA* 37 (2006), 101.
 32 *VA* 35 (2004), 82.
 33 *VA* 40 (2009), 108.
 34 Roberts, 2003, 57.
 35 Pearson, 1994, 76.
 36 *VA* 40 (2009), 108.
 37 Roberts, 2003, 54.
 38 *VA* 37 (2006), 105.
 39 *VA* 37 (2006), 103.
 40 *VA* 40 (2009), 110.
 41 *VA* 31 (2000), 110.
 42 Roberts, 2003, 115.
 43 C. Hewitt, *English Historic Carpentry* (Chichester: Phillimore, 1980), 282.
 44 *VA* 41 (2010), 89.
 45 *VA* 35 (2004), 77.
 46 *VA* 36 (2005), 76.
 47 *VA* 41 (2010), 87.
 48 *VA* 35 (2004), 81.
 49 *VA* 32 (2001), 83.
 50 *VA* 39 (2008), 114.
 51 *VA* 37 (2006), 105.
 52 Harding, 1993, 142.
 53 B. Meeson, 'Structural trends in English medieval buildings: new insights from dendrochronology', *VA* 43 (2012), 58.

Rod Wild is a Cambridge Mathematician and retired IT manager. He is now Data Secretary for the Domestic Buildings Research Group (Surrey)
rodwild@ntlworld.com

Andy Moir is director of Tree-Ring Services and a Post-Doctoral Research Fellow in the Institute for the Environment at Brunel University. He has worked on the tree-ring analysis of trees and timber-framed buildings for over 20 years
Tree-Ring Services, Hungerford, Berkshire, RG17 0NE, UK; akmoir@tree-ring.co.uk

APPENDIX

Details of date spans for the key features. The order of features is the same as in Figure 4

| | Key feature | Count | Min | 1 Q | Median | 3 Q | Max | Mean | Percentile Range (yrs.) | SD |
|-----------------------------|-------------------------------|-------|------|------|--------|------|------|------|-------------------------|------|
| 1. Building type | Open Hall | 85 | 1254 | 1347 | 1467 | 1546 | 1593 | 1461 | 199 | 58.5 |
| | Smoke Bay Central | 18 | 1537 | 1540 | 1560 | 1608 | 1609 | 1570 | 69 | 23.0 |
| | Smoke Bay End | 13 | 1544 | 1548 | 1578 | 1605 | 1607 | 1578 | 57 | 22.4 |
| | Smoke Hood | 7 | 1539 | 1543 | 1571 | 1582 | 1582 | 1565 | 39 | 15.8 |
| | Chimney Central | 27 | 1550 | 1551 | 1596 | 1688 | 1698 | 1606 | 137 | 42.4 |
| | Chimney Lateral | 18 | 1503 | 1527 | 1588 | 1662 | 1705 | 1595 | 135 | 44.3 |
| | Chimney End | 6 | 1547 | 1556 | 1604 | 1636 | 1642 | 1601 | 80 | 31.2 |
| 2. Open hall plan details | Open Hall 2 bay | 44 | 1309 | 1342 | 1446 | 1544 | 1571 | 1452 | 202 | 58.7 |
| | Open Hall 1 bay | 27 | 1389 | 1431 | 1494 | 1548 | 1552 | 1489 | 117 | 39.5 |
| | Wealden | 9 | 1440 | 1442 | 1476 | 1497 | 1499 | 1475 | 55 | 20.7 |
| | Overshot Cross Entry | 20 | 1436 | 1445 | 1481 | 1539 | 1541 | 1489 | 94 | 30.4 |
| | Internal jetty | 12 | 1380 | 1392 | 1449 | 1540 | 1541 | 1454 | 148 | 48.3 |
| 3. Roof trusses | Common Rafter | 6 | 1254 | 1272 | 1398 | 1445 | 1449 | 1379 | 173 | 70.8 |
| | Crown Post | 49 | 1309 | 1350 | 1446 | 1520 | 1534 | 1446 | 170 | 48.0 |
| | Crown Strut | 5 | 1345 | 1356 | 1436 | 1474 | 1474 | 1427 | 118 | 52.9 |
| | Fan truss | 4 | 1452 | 1454 | 1468 | 1468 | 1468 | 1464 | 14 | 7.8 |
| | Queen Struts 2 | 74 | 1436 | 1474 | 1555 | 1635 | 1648 | 1558 | 161 | 45.9 |
| | Queen Struts 3 | 14 | 1543 | 1545 | 1583 | 1622 | 1627 | 1581 | 77 | 28.5 |
| | Raking Queen Struts | 18 | 1557 | 1559 | 1599 | 1672 | 1705 | 1602 | 113 | 34.9 |
| 4. Roof Framing & Carpentry | Hipped | 61 | 1254 | 1338 | 1464 | 1554 | 1627 | 1461 | 216 | 62.7 |
| | Half Hipped | 37 | 1430 | 1516 | 1560 | 1673 | 1705 | 1571 | 158 | 47.4 |
| | Gabled | 74 | 1391 | 1443 | 1581 | 1657 | 1688 | 1563 | 214 | 66.1 |
| | Clasped Purlin total | 107 | 1411 | 1468 | 1560 | 1642 | 1705 | 1562 | 174 | 51.9 |
| | Butt Purlins InLine | 13 | 1554 | 1554 | 1594 | 1633 | 1634 | 1595 | 79 | 27.5 |
| | Butt Purlins Staggered | 5 | 1617 | 1625 | 1683 | 1696 | 1698 | 1671 | 71 | 31.9 |
| | Windbraces Curved | 44 | 1411 | 1448 | 1538 | 1564 | 1602 | 1520 | 117 | 41.6 |
| | Windbraces Straight | 42 | 1547 | 1552 | 1589 | 1637 | 1656 | 1590 | 84 | 24.3 |
| | Diminishing Principal Rafters | 59 | 1411 | 1457 | 1552 | 1609 | 1642 | 1542 | 152 | 46.6 |
| Flatways Rafters | 81 | 1254 | 1346 | 1468 | 1574 | 1608 | 1468 | 228 | 65.3 | |
| 5. Wall and floor framing | Arch Braces | 71 | 1254 | 1343 | 1481 | 1595 | 1617 | 1486 | 252 | 71.0 |
| | Down Braces Curved | 54 | 1440 | 1446 | 1555 | 1607 | 1627 | 1538 | 161 | 53.6 |
| | Down Braces Straight | 18 | 1576 | 1579 | 1610 | 1674 | 1683 | 1617 | 95 | 30.0 |
| | Framing Large Panels | 93 | 1254 | 1349 | 1477 | 1582 | 1609 | 1485 | 233 | 67.6 |
| | Framing Small Square Panels | 45 | 1547 | 1568 | 1596 | 1673 | 1705 | 1604 | 105 | 31.9 |
| | Decorative Panels | 4 | 1571 | 1571 | 1578 | 1582 | 1582 | 1577 | 10 | 5.2 |
| | Jowled Posts | 119 | 1309 | 1378 | 1499 | 1594 | 1617 | 1497 | 216 | 65.9 |
| | Jettying | 24 | 1391 | 1401 | 1523 | 1611 | 1642 | 1518 | 210 | 67.8 |
| | Joists Flat | 61 | 1309 | 1380 | 1460 | 1543 | 1557 | 1461 | 163 | 48.5 |
| | Joists on Edge or square | 75 | 1503 | 1536 | 1583 | 1671 | 1705 | 1588 | 134 | 39.5 |
| | Diminished Haunch Joist Joint | 36 | 1537 | 1543 | 1595 | 1653 | 1683 | 1592 | 110 | 33.9 |
| | Simple Tenon | 21 | 1411 | 1425 | 1508 | 1578 | 1617 | 1499 | 152 | 57.2 |
| | Dropped Tie | 5 | 1555 | 1562 | 1608 | 1639 | 1642 | 1606 | 77 | 32.5 |
| Attic | 27 | 1550 | 1555 | 1600 | 1687 | 1698 | 1605 | 132 | 39.6 | |
| 6. Carpentry | Moulded Crown Post | 9 | 1309 | 1343 | 1436 | 1488 | 1491 | 1432 | 145 | 52.3 |
| | Moulded Dais Beam | 10 | 1415 | 1424 | 1474 | 1528 | 1539 | 1476 | 104 | 35.6 |
| | Dais Panelling | 5 | 1452 | 1454 | 1499 | 1531 | 1533 | 1494 | 76 | 34.0 |
| | Spere Screen Evidence | 13 | 1436 | 1438 | 1472 | 1528 | 1533 | 1475 | 90 | 29.5 |
| | Scarf Side Halved | 45 | 1334 | 1420 | 1518 | 1620 | 1683 | 1516 | 200 | 72.7 |
| | Scarf 3/4 depth bridled | 29 | 1415 | 1438 | 1554 | 1613 | 1617 | 1548 | 175 | 48.7 |
| | Stops Flat Step | 31 | 1334 | 1352 | 1467 | 1521 | 1533 | 1458 | 169 | 48.6 |
| | Stops Curved Step | 37 | 1440 | 1458 | 1560 | 1613 | 1627 | 1561 | 155 | 39.5 |
| | Stops Lamb's Tongue | 29 | 1572 | 1575 | 1607 | 1680 | 1705 | 1611 | 105 | 32.2 |